

LHC Page 1

M. Albert – AB/OP/LHC

LHC Page1 Fill: 889.0 E: 450 GeV 29-11-2009 15:45:48

BEAM SETUP: CIRCULATE AND DUMP

BCT TI2:	0.00e+00	BCT TI8:	0.00e+00	I(B1):	2.12e+09	I(B2):	1.73e+09
TED TI2 position:	BEAM		TED TI8 position:	BEAM			
TDI P2 gaps/mm	upstream: 19.99		downstream: 19.96				
TDI P8 gaps/mm	upstream: 19.97		downstream: 19.99				

BTVD.683458.B1 Updated: 13:56:22

BTVDD.689339.B1 Updated: 13:56:22

BTVD.623458.B2 Updated: 13:56:22

BTVDD.629339.B2 Updated: 13:56:22

Comments 29-11-2009 15:45:06 : **SMP Flags**

Setting-up of TCTs in point 1. Expert to safe mode!!!!	Global Beam Permit	Beam 1	Beam 2
	Setup Beam	true	true
	Beam Presence	false	true
	Moveable Devices Allowed In	false	false
	Stable Beams	false	false

LHC Operation In CCC : 77600, 70480 PM Status B1 **ENABLED** PM Status B2 **ENABLED**

Header: Fill #, Energy, Date & Time, Machine Mode : Beam Mode

LHC Page1 Fill: 889.0 E: 450 GeV 29-11-2009 15:45:48

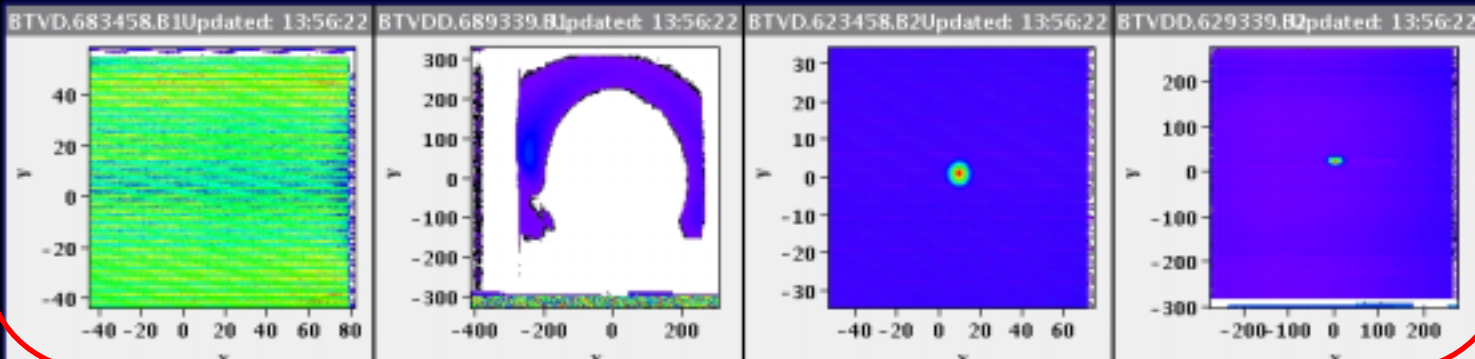
BEAM SETUP: CIRCULATE AND DUMP

BCT TI2: 0.00e+00 **BCT TI8:** 0.00e+00 **I(B1):** 2.12e+09 **I(B2):** 1.73e+09

TED TI2 position: BEAM **TED TI8 position:** BEAM

TDI P2 gaps/mm upstream: 19.99 downstream: 19.96

TDI P8 gaps/mm upstream: 19.97 downstream: 19.99



Comments 29-11-2009 15:45:06 :

Setting-up of TCTs in point 1.

Expert to safe mode!!!!

SMP Flags

	Beam 1	Beam 2
Global Beam Permit	true	true
Setup Beam	true	true
Beam Presence	false	true
Moveable Devices Allowed In	false	false
Stable Beams	false	false

LHC Operation in CCC : 77600, 70480

PM Status B1 **ENABLED** PM Status B2 **ENABLED**

Body:

Changes according to Beam Mode

OP comments and status of SMP flags

(SMP: Safe Machine Param)

CCC phone numbers and status of post mortem trigger

LHC Page1

Beam current measurement in T12 & T18

B1 & B2 Ring DC-Beam current acquisition

BCT T12:	0.00e+00	BCT T18:	0.00e+00	I(B1):	2.12e+09	I(B2):	1.73e+09
TED T12 position:	BEAM	TED T18 position:	BEAM				
TDI P2 gaps/mm	upstream: 19.99	downstream: 19.96					
TDI P8 gaps/mm	upstream: 19.97	downstream: 19.99					

BTVD.683458.B1Updated: 13:56:22 BTVDD.689339.B1Updated: 13:56:22 BTVD.623458.B2Updated: 13:56:22 BTVDD.629339.B2Updated: 13:56:22

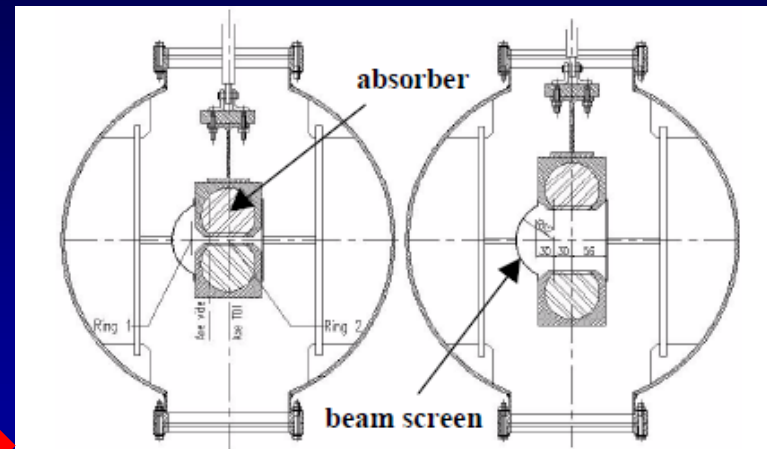
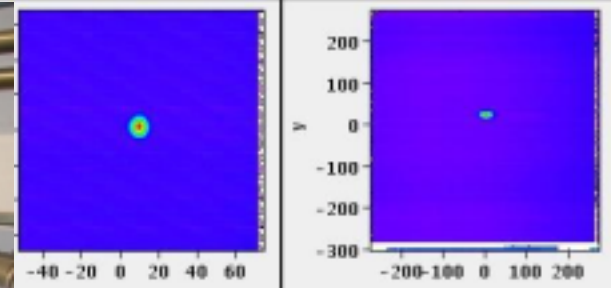


Figure 5: Cross section of the TDI (left: during injection, right: during acceleration and physics).

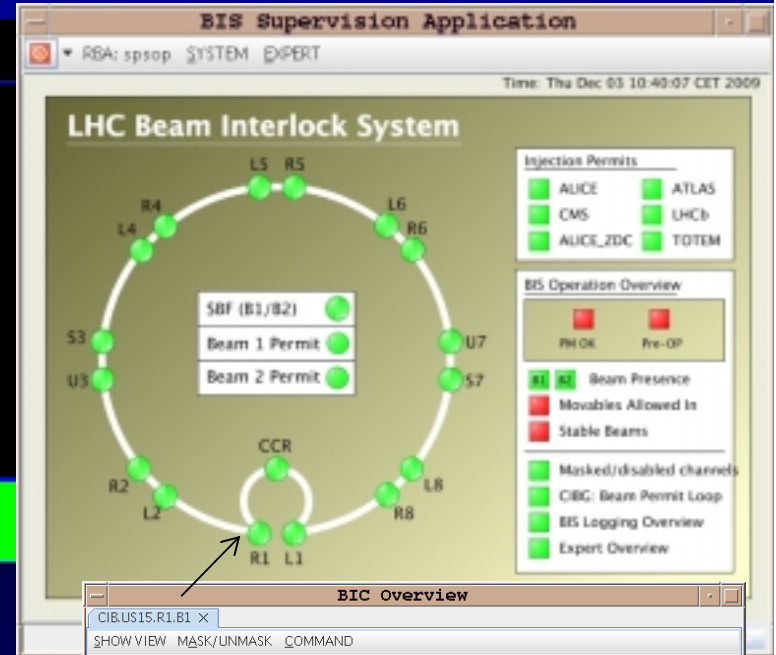
TED: Beam stoppers in T12 & T18 (BEAM := out, DUMP := in)

TDI : Injection protection devices for both injection points

LHC Page 1: Global Beam Permit

SMP Flags (Safe Machine Parameters)

	Beam 1	Beam 2
Global Beam Permit	true	true
Setup Beam	true	true
Beam Presence	false	true
Moveable Devices Allowed In	false	false
Stable Beams	false	false
PM Status B1	ENABLED	PM Status B2
	ENABLED	ENABLED



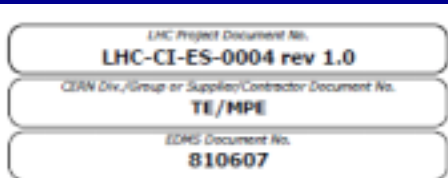
Global Beam Permit:

we can arm the Beam Interlock Systems of B1 & B2 independently

If B1 (B2) BIS is all green → Global Beam Permit = true

	INPUT	DISABLED	MASK SET	MATRIX	PERMIT
SOFTWARE	TRUE			TRUE	TRUE
INIT	TRUE			TRUE	
1	not used	YES			
2	not used	YES			
3	not used	YES			
4	Vacuum b...	NO		TRUE	
5	PIC_UNM	NO		TRUE	
6	ATLAS_Det	NO		TRUE	
7	LHCF_Det	NO		TRUE	
8	COLL#MO...	NO	NO	TRUE	
9	COLL#ENV...	NO	NO	TRUE	
10	not used	YES	NO		
11	not used	YES	NO		
12	PIC_MSK	NO	NO	TRUE	
13	ATLAS_Mag	NO	NO	TRUE	
14	not used	YES	NO		

More info on SMP:



LHC Page 1: Setup Beam

SMP Flags (Safe Machine Parameters)			
	Beam 1	Beam 2	
Global Beam Permit	true	true	
Setup Beam	true	true	
Beam Presence	false	true	
Moveable Devices Allowed In	false	false	
Stable Beams	false	false	
PM Status B1	ENABLED	PM Status B2	ENABLED

Setup Beam: (is what we used to called Safe Beam Flag) is a function of the Ebeam. For Ebeam=450 GeV the Setup Beam = true if the lbeam < 10¹².
General formula:

```
If (NBEAM1 * (Energy/450)1.7 < SBI_TH1) then "SBF1 = .TRUE." (or is forced ".FALSE."),  
else "SBF1 = .FALSE."  
If (NBEAM2 * (Energy/450)1.7 < SBI_TH2) then "SBF2 = .TRUE." (or is forced ".FALSE."),  
else "SBF2 = .FALSE."
```

where NBEAMi is the beam intensity measured by the DCBCT in IR4, and Energy is the beam energy as measured by the energy tracking system of the Beam Dump System (dipole current in S45, S56, S67 and S78 + Q4 + Septa)

LHC Page 1: Beam Presence

SMP Flags (Safe Machine Parameters)			
	Beam 1	Beam 2	
Global Beam Permit	true	true	
Setup Beam	true	true	
Beam Presence	false	true	
Moveable Devices Allowed In	false	false	
Stable Beams	false	false	
PM Status B1	ENABLED	PM Status B2	ENABLED

Beam Presence: is calculated according to the beam intensity measured by the Fast BCT in IR4.

General formula:

```
If (NB1 < MINIMUM_BEAM_INTENSITY) then "BPF1=.FALSE.", else "BPF1=.TRUE."  
If (NB2 < MINIMUM_BEAM_INTENSITY) then "BPF2=.FALSE.", else "BPF2=.TRUE."
```

The beam presence flag is crucial to determine if we can inject high intensity beams in the machine. Only if this is true we can do. Since the Fast BCT are the instruments used to define the flag, if there is unbunched beam in the machine the flag will be false.

LHC Page1 – Body 1

LHC Page1

Fill: 891.0

E: 7864 GeV

02-12-2009 09:53:17

BEAM SETUP: SETUP

TED T12 position:

DUMP

TED T18 position:

DUMP

TDI P2 gaps/mm

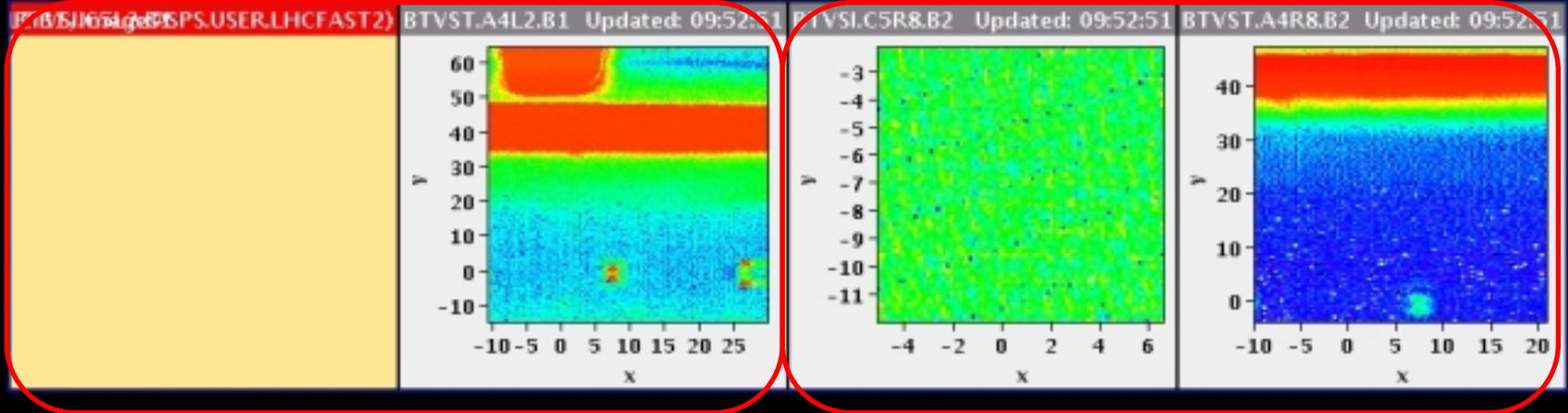
upstream: 19.99

downstream: 19.97

TDI P8 gaps/mm

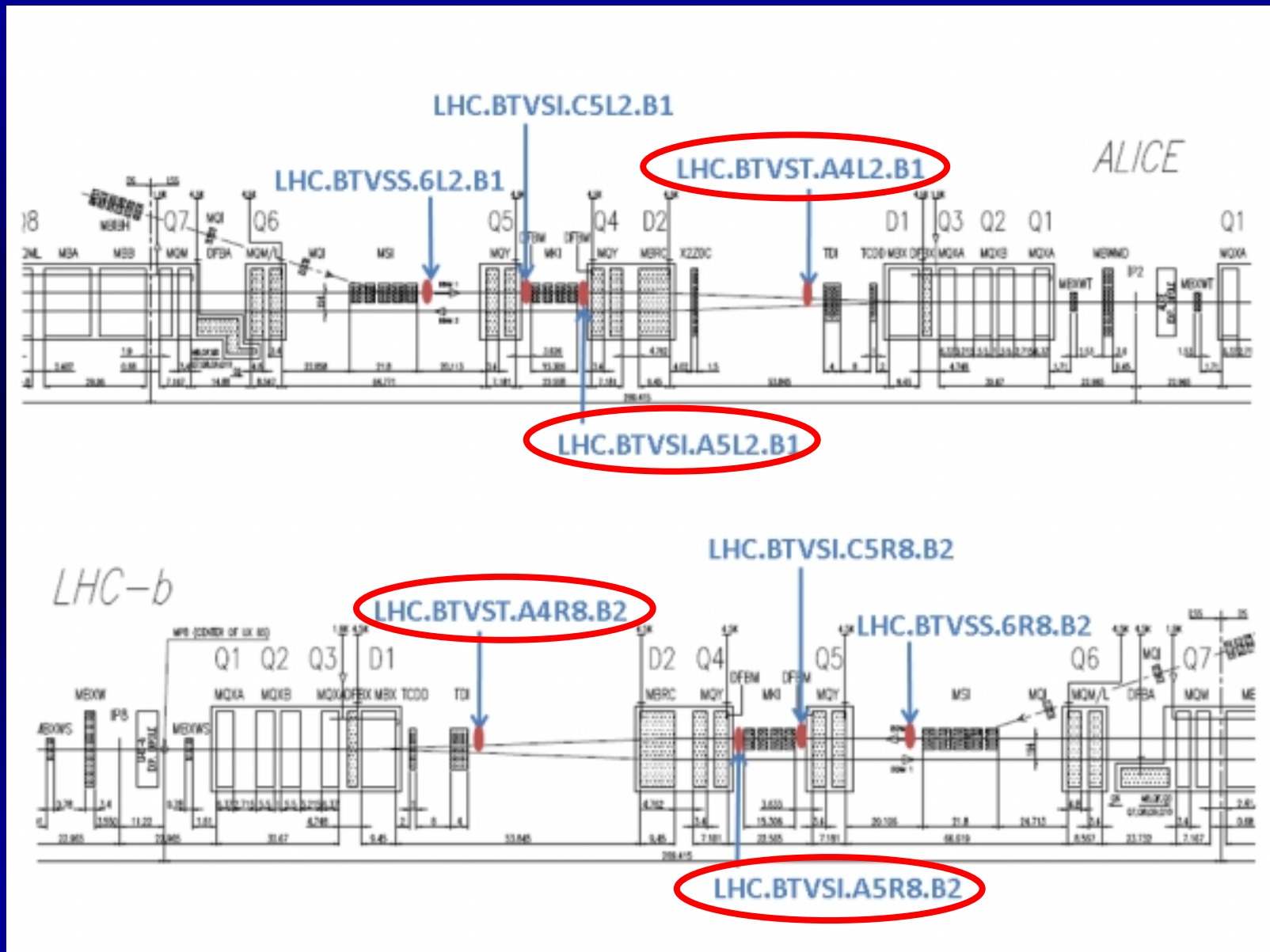
upstream: 19.97

downstream: 19.98



BTV in injection part appear for Beam Modes = SETUP during which transfer line and injection setup is done, i.e. Beam to TEDs and then to TDIs.

LHC Page1 – Body 1



LHC Page1 – Body 2

LHC Page1

Fill: 893.0

E: 450 GeV

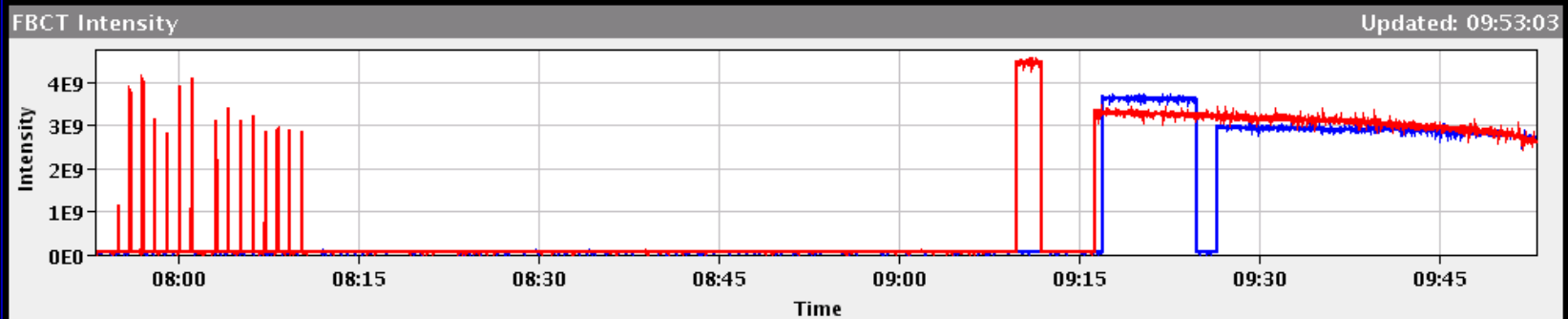
03-12-2009 09:53:03

BEAM SETUP: INJECTION PROBE BEAM

BCT TI2: 0.00e+00 **BCT TI8:** 0.00e+00 **I(B1):** 4.11e+09 **I(B2):** 2.32e+09

TED TI2 position: BEAM **TED TI8 position:** BEAM

TDI P2 gaps/mm upstream: 19.98 downstream: 19.97
TDI P8 gaps/mm upstream: 8.17 downstream: 7.61



Comments 03-12-2009 09:40:36 :

SMP Flags

Total ring beam current measurement of **B1** and **B2** from Fast Beam Current Transformer

Update rate: 1Hz Time interval covered: 2h currently

Displayed during injection modes = INJECTION PROBE BEAM, INJECTION SETUP BEAM, INJECTION PHYSICS BEAM

LHC Operation in CCC : 77600, 70480

PM Status B1

ENABLED

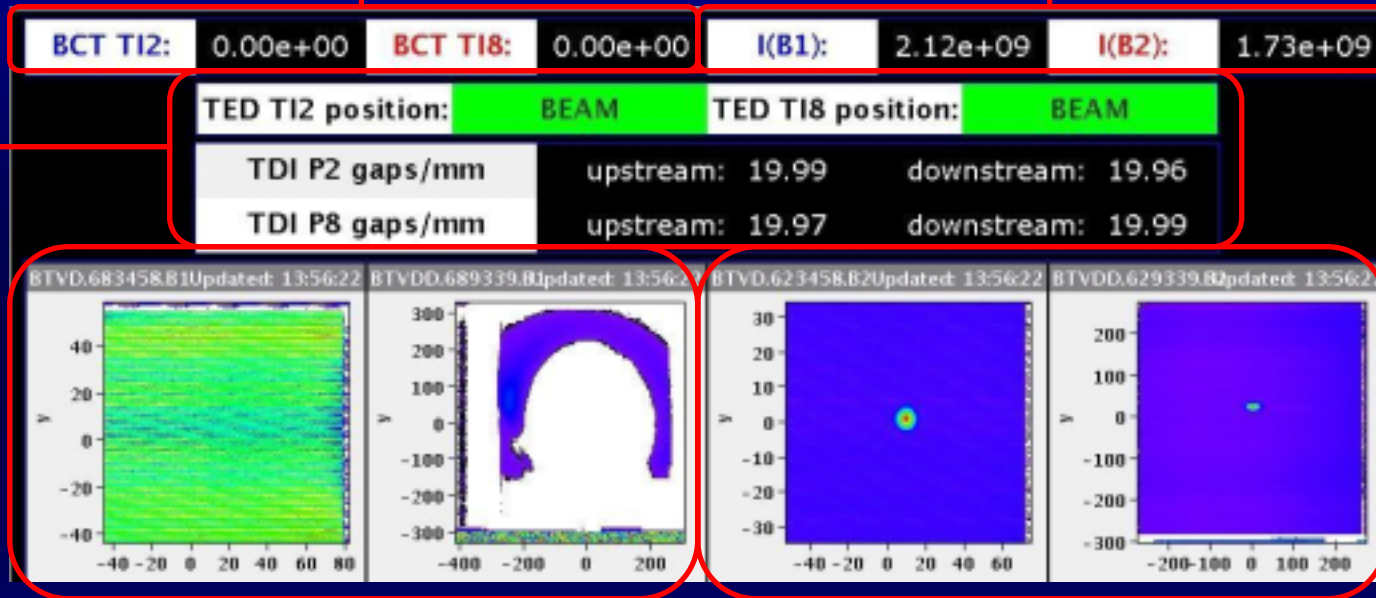
PM Status B2

ENABLED

LHC Page1 – Body 3

Beam current measurement in TI2 & TI8

Ring DC-Beam current measurement of B1 and B2



Beam screens in dump line for B1

Beam screens in dump line for B2

BTV in the dump lines appear for Beam Modes = BEAM DUMP, INJECT & DUMP, CIRCULATE & DUMP

TED: Beam stoppers in TI2 & TI8 (BEAM := out, DUMP := in)

TDI : Injection protection devices for both injection points

LHC Page 2: Cryo status

LHC Cryogenics Page1

03-12-2009 11:17:03

BEAM SETUP: INJECTION PROBE BEAM

S 12	CM ITR1	CS ITR1	CM MSR1	CS MSR1	CM AR12	CS AR12	CM MSL2	CS MSL2	CM ITL2	CS ITL2
S 23	CM ITR2	CS ITR2	CM MSR2	CS MSR2	CM AML3	CS AML3				
S 34	CM AMR3	CS AMR3	CM MSL4	CS MSL4						
S 45	CM MSR4	CS MSR4	CM AR45	CS AR45	CM MSL5	CS MSL5	CM ITL5	CS ITL5		
S 56	CM ITR5	CS ITR5	CM MSR5	CS MSR5	CM AR56	CS AR56	CM MSL6	CS MSL6		
S 67	CM MSR6	CS MSR6	CM AML7	CS AML7						
S 78	CM AMR7	CS AMR7	CM MSL8	CS MSL8	CM ITL8	CS ITL8				
S 81	CM ITR8	CS ITR8	CM MSR8	CS MSR8	CM AR81	CS AR81	CM MSL1	CS MSL1	CM ITL1	CS ITL1

RF : CM 1L4 CS 1L4 CM 2L4 CS 2L4 CM R4 CS 1R4 CM 2R4 CS 2R4

Average Temperatures (in K):

ARC12: 1.92	ARC23: 1.92	LSS12: 3.13	LSS23: 3.46	DFB12: 4.43	DFB23: 4.44
ARC34: 1.91	ARC45: 1.91	LSS34: 4.15	LSS45: 3.95	DFB34: 5.83	DFB45: 5.62
ARC56: 1.91	ARC67: 1.93	LSS56: 3.60	LSS67: 4.48	DFB56: 5.57	DFB67: 4.47
ARC78: 1.93	ARC81: 1.92	LSS78: 3.07	LSS81: 3.16	DFB78: 4.43	DFB81: 4.40

60A Power Permit:

S12 S23 S34 S45 S56 S67 S78 S81

CM: Cryo maintain → if false the circuits that are powered follow a Fast Power Abort
CS: Cryo start → if false we cannot start powering the circuits, but if they are already powered and becomes false, they stay powered

LHC Page 3: LHC operations

03-Dec-2009 11:18:11

Fill #: 893

Energy: 0.450 TeV

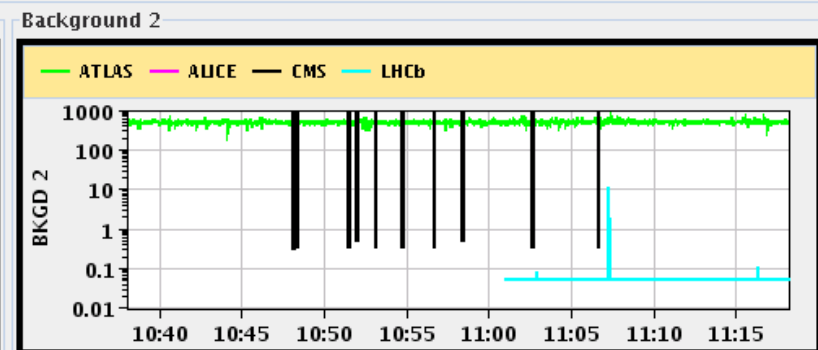
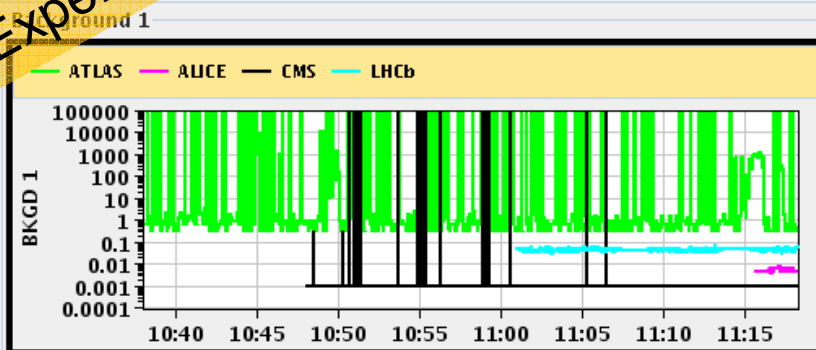
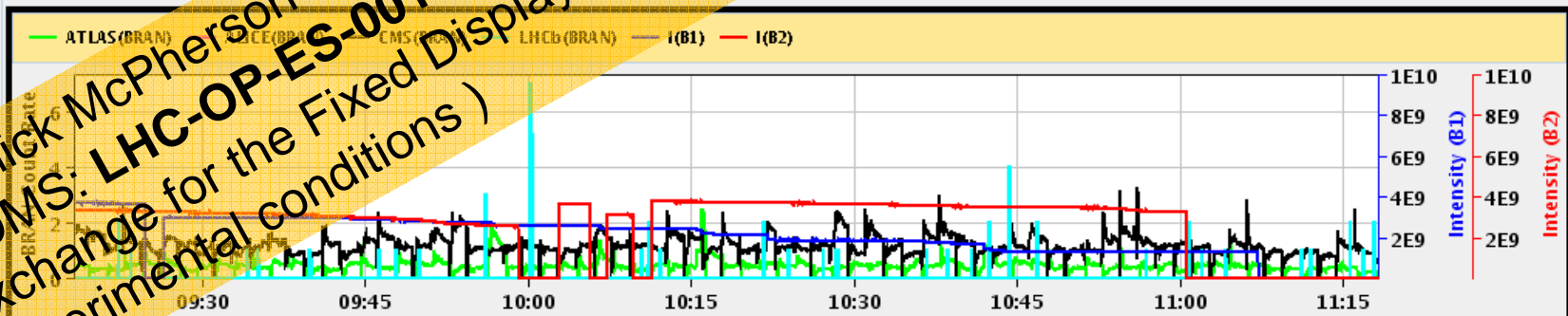
I(B1): 4.50e+07

I(B2): 5.00e+07

	ATLAS	ALICE	CMS	LHCb
Experiment Status	STANDBY	STANDBY	STANDBY	STANDBY
Instantaneous Luminosity	0.000e+00	0.000e+00	-2.933e-04	0.000e+00
BRAN Count Rate	1.667e-01	0.000e+00	6.538e-01	0.000e+00
BKGD 1	0.298	0.005	0.001	0.056
BKGD 2	450.000	0.000	0.000	0.050
BKGD 3	0.000	0.014	0.001	0.007

LHCf **STANDBY** Count(Hz): LHCb VELO Position **OUT** TOTEM: **OFF**

Performance over the last 2 hrs



By Alick McPherson
 (EDMS: LHC-OP-ES-0018 Data
 Exchange for the Fixed Display of
 Experimental conditions)